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Report of the individual review of the greenhouse gas inventory of the Czech Republic submitted in 2005*

* In the symbol for this document, 2005 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2005 greenhouse gas (GHG) inventory submission of the Czech Republic, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 3 October to 8 October 2005 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Ms. Mirja Kosonen (Finland) and Mr. Jim Penman (United Kingdom); Energy – Ms. Sumana Bhattacharya (India), Mr. Christov Christo (Bulgaria) and Mr. Hugh Saddler (Australia); Industrial Processes – Mr. Jochen Harnisch (Germany) and Mr. Stanford Mwakasonda (Republic of South Africa); Agriculture – Mr. Samuel Adejuwon (Nigeria) and Mr. Leonard Brown (New Zealand); Land Use, Land-use Change and Forestry (LULUCF) – Mr. Hector Ginzo (Argentina) and Mr. Zoltan Somogyi (Hungary); Waste – Mr. Carlos Lopez (Cuba) and Mr. Takashi Morimoto (Japan). Mr. Carlos Lopez and Mr. Jim Penman were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention", a draft version of this report was communicated to the Government of the Czech Republic, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Inventory submission and other categories of information

3. In its 2005 submission, the Czech Republic submitted common reporting format (CRF) tables for the years 1995 and 2003 plus overview (CRF table 10) data for the years 1990–2003 inclusive, and a national inventory report (NIR).

C. Emission profiles and trends

4. In 2003, the most important GHG in the Czech Republic was carbon dioxide (CO_2), contributing 83.7 per cent to total[1] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4), 6.9 per cent, and nitrous oxide (N_2O), 5.5 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 1.2 per cent of the overall GHG emissions in the Czech Republic. The Energy sector accounted for 83.8 per cent of the total GHG emissions, followed by Industrial Processes (8.8 per cent), Agriculture (5.0 per cent), Waste (1.9 per cent) and Solvents and Other Product Use (0.3 per cent). Total GHG emissions amounted to 147,203 Gg CO_2 equivalent and had decreased by 23.3 per cent between 1990 and 2003. The decrease occurred between 1990 and 1995 and, apart from inter-annual variations, total emissions have been relatively level since 1995. There have been very large increases in percentage terms in emissions of fluorinated compounds since 1995. These trends are reasonable for a country with an economy in transition.

[1] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO^2 equivalent excluding LULUCF, unless otherwise specified. The Czech Republic has not provided the tables of the common reporting format for LULUCF as required by decision 13/CP.9 using the land use categories of the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-use Change and Forestry*. Instead it has used the common reporting format tables for Land-use Change and Forestry as contained in the common reporting format adopted by decision 18/CP.8, which are based on the categories of the Intergovernmental Panel on Climate Change *Revised 1996 Guidelines for National Greenhouse Gas Inventories*.

D. Key categories

5. The Czech Republic's 2005 submission reports level and trend tier 1 key category analyses. The level assessment agrees with the assessment made by the secretariat,[2] with some differences involving categories contributing collectively around 1 per cent to total emissions. The secretariat's analysis identified ammonia production as a key category for the first time. The Party's trend assessment identifies two additional key categories in the Industrial processes sector: mineral products decarbonizing and new gases. LULUCF is not included in the key category analysis. Key category analysis has been used as tool in inventory improvement planning.

E. Main findings

6. The 2005 submission provides full CRF data for 1995 and 2003 and summary data for other years in the period since 1990. Coverage of gases is complete although there some omissions at the sectoral level, particularly in Land-use Change and Forestry (LUCF), which is reported using the old CRF tables, not the new ones as required by decision 13/CP.9. The expert review team (ERT) noted with appreciation that the NIR follows the structure set out in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". Use could be made of annexes to the NIR to provide greater transparency. The ERT noted that the NIR shows a systematic approach to the development of the inventory, particularly on recalculations and on quality assurance/quality control (QA/QC) activities, reflecting the national circumstances of an economy in transition. The full list of materials used during the review is provided in the annex to this report.

1. Completeness

7. All gases are included in the inventory. There are CRF tables for the years 1995 and 2003. In the LUCF sector, the report is restricted to category 5.A Changes in Forest and Other Woody Biomass Stocks, and data are reported using the old format. Recalculation tables are not provided. Emission trends are presented for the whole period 1990–2003 using the summary tables. Throughout the tables the notation keys are used only in a limited way and "0" is used in a number of sectoral data and background data tables.

2. Transparency

8. The estimations are generally transparent for the Energy and Agriculture sectors, although in the case of the former the method used to determine the emission factor (EF) for CH_4 from underground mines should be documented. In the Industrial Processes sector transparency could be improved by reporting for iron and steel and nitric acid production the numbers of plants involved and the prevailing technologies, and by separating in the NIR the description of lime from cement for lime production. In LUCF the use made of the forest inventory and parameter specification should be clarified, and the descriptions of background data and methodologies could be improved in the Waste sector.

[2] The secretariat identified, for each Party, those category categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.* Key categories according to the tier 1 trend assessment were also identified for those Parties that provided a full set of CRF tables for the year 1990. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

3. Recalculations and time-series consistency

9. Although the Party has not provided CRF recalculation tables, the NIR contains a section summarizing the history of and future plans for recalculations, which are clearly a significant issue for all countries with economies in transition. The ERT commends the Czech Republic for including this section. It is at present mainly descriptive, and the ERT suggests that more quantitative material could be included to increase transparency and explain the magnitude of the changes involved. Bibliographic references could also usefully be added. The ERT also encourages the Czech Republic to complete the recalculation tables in the NIR so that the recalculations can be tracked over time. The ERT believes that the recalculations should improve time-series consistency, but greater transparency would help to demonstrate this – for example, where gap-filling procedures have been used to provide missing data or to replace inconsistent data this should be clarified, and if they have been so used it should be explained how they relate to the advice given in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

4. Uncertainties

10. The Party has undertaken a qualitative assessment of uncertainties and for the first time a preliminary quantitative tier 1 uncertainty analysis has been performed for the key categories, using mainly IPCC default uncertainty ranges. The NIR summarizes the results and states that the Party plans to develop the uncertainty analysis and use it for prioritizing the development of the inventory by means of a tier 2 key category analysis.

5. Verification and quality assurance/quality control approaches

11. The Party has described the organization of the national inventory system. The Czech Hydrometeorological Institute (CHMI) is responsible for the inventory under the supervision of the Ministry of Environment. Activity data (AD) are from official channels (the Czech Statistical Office (CSO) and the Ministry of Environment), and this is assumed to guarantee QA. Some QA/QC procedures are described, including cross-checks between the sectoral data and national data. The ERT suggests that a formal QA/QC plan be developed.

F. Areas for further improvement

1. Identified by the Party

12. Section 9.2 identifies plans to complete the reallocation of emissions related to non-energy use of fuels in ammonia and iron and steel production from the Energy sector to the Industrial Processes sector; to improve the estimation of N_2O emissions from road transport; to introduce the IPCC good practice guidance tier 2 method for CH_4 emissions from enteric fermentation; and to use the first-order decay (FOD) method for CH_4 emissions from waste.

2. Identified by the ERT

13. In addition to the improvements identified by the Party, the ERT recommends that the Czech Republic provide full CRF data for all years, prepare recalculation tables, complete the estimation of the LULUCF sector using the CRF tables as agreed in decision 13/CP.9, and develop a QA/QC plan, drawing together the sector-specific QA/QC procedures described throughout the NIR and recognizing the need for inter-agency cooperation. Recommended improvements relating to specific category/sink categories are presented in the relevant sector sections of this report.

II. Energy

A. Sector overview

14. In 2003, GHG emissions from the Energy sector contributed 83.8 per cent of the total GHG emissions of the Czech Republic as compared to 89 per cent in 1990. The change in the percentage share between 1990 and 2003 is due to the reallocation of emissions from ammonia and iron and steel production from the Energy sector to Industrial Processes sector. GHG emissions from the Energy sector fell from 171,018 Gg CO_2 equivalent in 1990 to 123,398 Gg in 2003 (see table 2.5 of the NIR, data for 2003). Emissions fell rapidly between 1990 and 1994. In 2003, 95.3 per cent of emissions from this sector originated from fossil fuel combustion; the remainder were from fugitive emissions (mainly solid fuels). The contributions in 2003 from CO_2, CH_4 and N_2O were 94.2 per cent, 4.5 per cent and 1.3 per cent, respectively.

15. The NIR is transparent with respect to most emission categories in the Energy sector. The main exception is the reallocation involved in moving CO_2 emissions associated with the production of iron and steel and of ammonia from the Energy sector to the Industrial Processes sector (see below).

16. The QA/QC procedures followed include the verification of the AD in the national energy balance for 2004 generated by the CSO, using sectoral data from the Czech Mining Authority, the Employers Federation of the Mining and Petroleum Industry, the Miners Association, the Czech Association of the Petroleum Industry and Trade, the annual report of the distribution companies of the gas industry, and the Transgas Balance. Data from transport and household subcategories were verified and supplemented using specialized models. Formal random checks of data entered in the CRF tables were undertaken by the CHMI.

17. A tier 1 uncertainty analysis was undertaken using IPCC default uncertainty factors and country-specific expert judgement. The results of the analysis indicate that CO_2 from stationary combustion of solid fuels accounted for nearly half the total level uncertainty and well over half the total uncertainty in trend. This is because this category accounts for over half of total national emissions.

18. Planned improvements include the use of the IPCC good practice guidance and country-specific data (as soon as they are available) to recalculate emissions of N_2O from road transport. A study is also planned to determine the ratio of CH_4 emitted to mass of brown coal mined by surface mining in order to determine a country-specific EF.

19. The inventory submitted for 2003 is based on preliminary and estimated activity (fuel consumption) data because final fuel consumption data, including data included in the Party's response to the International Energy Agency (IEA) questionnaire, were not available from the CSO until after the date for submission of the NIR. The NIR states that this contributes to an uncertainty of between 2 per cent and 5 per cent in the AD, and hence the emissions estimates. It is recommended that all relevant emissions be recalculated for the Party's next submission using the final data for 2003 and that the same procedure be followed for all subsequent submissions.

1. Comparison of the reference approach with the sectoral approach and international statistics

20. CO_2 emissions estimated using the reference and the sectoral approaches differ by 8.69 per cent. The difference is due to the non-energy use of liquid fuel and solid fuels in ammonia production and metals production being counted as energy use in the reference approach. Data in the NIR show that, when allowance is made for the quantities of CO_2 emitted from these fuels and reported under industrial processes, the difference falls to 1.43 per cent, which is well within expectations. This is explained in the documentation box for CRF table 1A(c) and in the 2003 NIR.

21. In a number of sectors the activity (fuel consumption) data are inconsistent with the corresponding IEA data for the Czech Republic. This is presumably related to the use of preliminary and estimated AD because the final data were not available, as already identified in paragraph 19, and will be resolved in the same way.

2. International bunker fuels

22. There is a discrepancy between the Czech Republic's 2005 submission and the IEA fuel consumption figures for international aviation fuel, which is explained by the lack of final data described in the preceding paragraph and paragraph 19.

3. Feedstocks and non-energy use of fuels

23. Parameters for estimation of the quantity of masout (residual fuel oil) used for ammonia production were taken directly from relevant technical literature, and this quantity is not reported in the Energy sector (sectoral approach). Corresponding CO_2 emissions have been reported in the Industrial processes sector in table 2(I)s1 of the CRF since 2003. Similarly for iron and steel production, metallurgical coke used in blast furnaces has not been reported under the Energy sector (sectoral approach) since 2001, and neither has blast furnace gas. However, all relevant fuels for both energy and non-energy use are included in the reference approach. The ERT encourages the Czech Republic to provide a more detailed explanation in the NIR on the procedure to allocate fuels, and to present the quantities of all relevant fuels. Default values are used for carbon storage ratios of naphtha used as a petrochemical feedstock in table 1.A(d). It would be preferable to replace default ratios by plant-specific data.

B. Key categories

1. Mobile combustion: Road: LPG – General

24. Consumption of 4.01 PJ of liquefied petroleum gas (LPG) in 2003 is reported under this heading. This is added into Other Fuels at the top of table 1.A(a)s1, whereas it should be added into Liquid Fuels. Because this LPG is reported as Other, neither the fuel consumption nor the CO_2 emissions are included in the total sectoral approach liquid fuels reported in table 1.A(c). If the CO_2 from this LPG were included, and there were no other changes, the difference in CO_2 emissions between the reference and sectoral approaches would fall to 0.8 per cent. The misallocation is a problem with the CRF template which the ERT understands has now been solved.

2. Other sectors

25. The LPG consumption discussed in the previous paragraph should be identified under Road Transportation in the NIR.

3. Fugitive emissions from coal mining and handling

26. Country-specific EFs are used to estimate CH_4 emissions from the five major underground mines producing gassy hard coal (a sixth underground mine is very small). For the remaining mines, most of which produce brown coal (lignite) from surface mines, a tier 1 approach using default EFs is used. These emissions contributed about 3.3 per cent of total national GHG emissions in 2003. Possible emissions from closed mines have not been estimated.

27. The Czech Republic's country-specific EFs for CH_4 have been generated to estimate the emissions from this category since 1996, which has reduced the estimates of emission levels considerably as compared to the value estimated previously on the basis of the default EFs. A similar recalculation for the years 1990 to 1995 was undertaken several years ago. The ERT also recommends the inclusion in the

NIR of more complete documentation of the method used for determining the CH_4 EF from underground mines in order to make the estimates more transparent.

28. Surface mine emissions also fell between 1995 and 2003. The standard default EFs have been used for estimating emissions from surface mines and post-mining activities. The Party plans a study to determine the ratio between CH_4 produced and brown coal produced by surface mining in order to provide an EF that reflects national characteristics.

29. The CO_2 emissions from flue gas desulphurization at the power plants are reported as Fugitive Emissions From Solid Fuel – Other. The ERT recommends that they be reported under Industrial Processes as limestone consumption.

III. Industrial Processes and Solvent and Other Product Use

A. Sector overview

30. In 2003, the Industrial Processes and Solvent and Other Product Use sectors contributed 8.8 per cent and 0.3 per cent, respectively to the total GHG emissions of the Czech Republic. Emissions from the Industrial Processes sector increased by 176 per cent from 1990 to 2003. An increase of 91 per cent of the emissions from the sector is reported from 2002 to 2003. These increases are due to the reallocation of emissions from the Energy sector to the Industrial Processes sector, mainly from the iron and steel industry and ammonia production.

31. The CRF includes estimates of most gases and emission categories from the Industrial Processes sector, as recommended by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), but as with other sectors, detailed data are provided only for 1995 and 2003. The Czech Republic is encouraged to complete the time series, to provide estimates for the categories that are currently missing, and to complete CRF table 9 (Completeness) as well as making use of the notation keys, as appropriate.

32. The ERT noted that in the Czech Republic's 2005 NIR uncertainty considerations are missing for the Industrial Processes sector. The Czech Republic is strongly encouraged to structure the description of the source categories in the NIR in such a way as to parallel the CRF. The NIR already contains some details on sector-specific QA/QC; this could usefully be extended.

B. Key categories

1. Cement production – CO_2

33. The estimates are based on cement production data. The NIR gives details on AD collection and QA/QC. The NIR briefly notes the alternative approach using clinker data, which would result in a lower emissions estimate and is generally more accurate where data are available to support it. The ERT encourages the Czech Republic to use clinker data and the associated tier 2 method for this key category in its future submissions.

2. Iron and steel production – CO_2

34. Emissions from this category have been reallocated to the Industrial Processes sector from the Energy sector in the 2005 submission. Emissions are reported for 1995 and 2003, with a significant drop between the two years, the reasons for which are not clear. A tier 1 method for emissions estimation has been used, based on amount of coke used as reducing agent. The NIR reports that the application of QA/QC has revealed an underestimation of emissions in some years, but the relevant CRF tables are not available. AD are not reported for 2003. The NIR further reports that in the 2006 submission the entire

time series from 1990 will be recalculated to properly reflect a correction in the amount of coke used. The Czech Republic is encouraged to improve the transparency of its inventory by reporting the number of plants, the prevailing technologies and the characteristic AD and EFs.

2. Nitric acid production – N_2O

35. The discussion of N_2O emissions from nitric acid production is incorrectly included under the subheading Methane and Nitrous Oxide Emissions. The NIR mentions the sourcing of AD and gives an analysis of the EFs, which are representative for the current and past situation at Czech nitric acid plants, but the estimate is not transparent and the Czech Republic is encouraged to give additional details on this key category, including the number of plants, the prevailing technologies, and the characteristic AD and EFs.

3. Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

36. This category is characterized as a key category by the Party on both level and trend assessments. Potential emissions are reported on the basis of fluid consumption data from the Customs authorities. QA/QC for this category is reported to be under development. The current data collection procedure is likely to omit gases that are imported into the Czech Republic as part of products – for example, in car air conditioners, appliances, foams or aerosol products – and these emissions should be estimated using estimated product inventories.

4. Ammonia production – CO_2

37. Emissions have been estimated based on ammonia production data, but the NIR does not give clear details on the approach used. The Party is encouraged to describe in detail the approach used for this key category. It was also noted that for 1995 CO_2 emissions are noted as "included elsewhere" ("IE"), whereas for 2003 a figure is provided.

C. Non-key categories

Lime production – CO_2

38. The NIR gives details on AD collection and QA/QC for lime production. The Party is encouraged to separate the discussion of lime production from that of cement production in the NIR. The discussion on CO_2 emissions in relation to lime production and use, resulting in zero net emissions, is not clear and appears to be inconsistent with the IPCC methodologies, which the Party is encouraged to adopt.

IV. Agriculture

A. Sector overview

39. In 2003, the Agriculture sector in the Czech Republic was responsible for GHG emissions amounting to an estimated 7.4 Gg CO_2 equivalent, or 5 per cent of total national GHG emissions. Emissions had decreased by 5.1 Gg CO_2 equivalent, or 40.8 per cent, from 12.5 Gg CO_2 equivalent in 1990. The primary drivers for this are falls in animal numbers, especially cattle. The Czech Republic identified three key categories: direct and indirect emissions of N_2O from agricultural soils (together accounting for 64.7 per cent of emissions from the sector); and CH_4 from enteric methane (21.5 per cent of the sector's emissions). The secretariat also identified CH_4 from manure management in the level analysis.

40. AD are taken from the Czech Republic *Statistical Yearbook* for 2003, produced by the CSO. The ERT encourages the Czech Republic to include information in the NIR on the agricultural census or survey interval and procedures, as well as any QA/QC procedures used by the CSO. The livestock

population and fertilizer AD reported are from the year 2002, as reported in the *Statistical Yearbook* for 2003. In response to a question during the review, the Party informed the ERT that the annual census date is 1 April. The ERT noted that interpolation could be used to better represent livestock numbers for calendar years.

41. The NIR notes that the methodology used for calculating CH_4 emissions from enteric fermentation has been revised and the Czech Republic has developed new emissions estimates for the period 1990–2002 using country-specific data to enable a more detailed classification of productivity. Recalculations will be presented in the national inventory when QA/QC procedures are implemented, possibly in the 2006 submission. The NIR also notes that this will be followed by a similar study of manure management emissions. The ERT commends the Czech Republic for undertaking national studies and encourages it to report the improved data with supporting documentation.

B. Key categories

1. Direct N_2O from agricultural soils

42. Direct N_2O emissions from agricultural soils are dominated by emissions from the use of nitrogenous fertilizers (47 per cent of the emissions in this category) and emissions from animal wastes applied to soils (32 per cent of the emissions in this category). A tier 1 methodology is used with the default EF of 0.0125 kg N_2O-N/kg nitrogen (N) for fertilizer, animal waste applied to soil, N-fixing crops and crop residue applied to the soil. The EF for cultivated histosols is the default from the Revised 1996 IPCC Guidelines of 5 kg N_2O-N/kg N/ha/yr. This was updated to 8 kg N_2O-N/ kg N/ha/yr in the IPCC good practice guidance. The ERT recommends that the Czech Republic use the updated default value.

43. As noted in previous reviews, the Czech Republic has not reported the fractional parameters and the ERT encourages the Party to complete the relevant additional tables. The sum of animal waste management systems (AWMS) (excluding pasture, range and paddock) multiplied by the IPCC default for $Frac_{GASM}$ of 0.2 does not produce the same value as is reported in table 4.D (there is a 3.6 per cent difference). The ERT recommends that the Czech Republic ensure consistency across the tables.

2. Indirect N_2O from nitrogen used in agriculture

44. N_2O from nitrogen leaching and run-off produces 84 per cent of the emissions in this category. The Czech Republic uses the IPCC default EF of 0.025 kg N_2O-N/kg N. Volatilization produces the remaining 16 per cent of emissions and here as well the Czech Republic uses an IPCC default EF. The emission values reported for leaching and volatilization are consistent with the direct emissions from agricultural soils (assuming IPCC default fractional parameters). The comments made in paragraph 43 about reporting fractional parameters also apply here.

3. Enteric fermentation – CH_4

45. Enteric fermentation accounts for 75.97 Gg (72 per cent) of the total CH_4 emissions (105.91Gt) in the Agriculture sector. Cattle collectively account for 80.4 per cent of CH_4 emissions from enteric fermentation, and non-dairy cattle account for 53 per cent. Swine account for 15.1 per cent of CH_4 emissions from enteric fermentation. A national approach is used for estimating emissions. This leads to values which are about one-third lower than the corresponding values for Eastern and Western Europe based on a tier 1 method. The differences in emissions values between the Czech Republic and other European countries were considered significant by the ERT in the previous (2004) review. The Czech Republic explained that the national methodologies adopted were prepared before the IPCC good practice guidance was published and that it will include updated methodology and emissions when the data have undergone QA/QC. The ERT noted that the Czech Republic has used a methane conversion

factor of 0.08 instead of the 0.06 used by Western Europe and recommends that, if this value is retained, additional information supporting its use be included in the NIR.

4. Manure management – CH_4

46. Manure management is identified as a key category by the secretariat's analysis but not by the Party's. CH_4 emissions from manure management account for 29.94 Gg (28 per cent) of the total CH_4 emissions in the Agriculture sector. Of this, swine contribute 26.47 Gg, or 88.4 per cent, followed by cattle, with dairy cattle having 6.5 per cent. These values are derived from national methodologies using equations in the Revised 1996 IPCC Guidelines. They are low in comparison with values from other European countries: for example, the Czech Republic reports a CH_4 implied emission factor (IEF) of 3.29 kg CH_4/hd/yr for dairy cows compared to 6 for Eastern Europe and 14 for Western Europe (IPCC default values). The ERT noted that the Czech Republic is revising its methodology for estimating emissions from manure management and encourages it to do so to ensure comparability between the different Parties' reports. CH_4 emissions from manure management are observed to have declined from 1900 to 2003.

C. Non-key categories

1. Manure management – N_2O

47. The nitrogen excretion rate (Nex) for poultry (1.0 kg N/head/year) is higher than the IPCC default value of 0.6 kg N/head/year. This has been noted in previous reviews and the ERT reiterates that the reason for this EF should be further explained in the NIR.

48. The amount of N reported for each AWMS is in tonnes, not kg. The effect is to produce IEF values which are 1,000 times higher than those for other Parties. The Czech Republic noted that this conversion is used because of the limited width of the spreadsheet column. However, for comparability between Parties, the ERT recommends that the Czech Republic report in kg units. The sum of N in the AWMS does not equal the product of the livestock Nex and population (even after converting from tonnes to kg). There is a 62.6 per cent difference for poultry and a 37 per cent difference for horses and goats. Other livestock exhibit smaller differences. The ERT recommends that the Czech Republic ensure consistency across table 4.B(b).

49. Although this is not a key category, the ERT encourages the Czech Republic to determine a country-specific allocation of the distribution of livestock to different AWMS. The value "0" is used for lagoons, whereas "not occurring" ("NO") would be more appropriate.

2. Animal production – N_2O

50. The figures given for N from animal waste deposited on soils differ by about 1.4 per cent from the total N from the pasture, range and paddock AWMS in table 4.B(b). The ERT encourages the Czech Republic to ensure consistency between the tables.

V. Land Use, Land-use Change and Forestry

A. Sector overview

51. The Czech Republic has provided data using only Summary table 5, table 5.A (Changes in Forest and Other Woody Biomass Stocks) and table 5.E (Other). Estimates for 1995 have been recalculated, and the 2003 data are new. Data for other years are not provided, and the inventory does not include information on afforestation, reforestation, deforestation or other land-use changes. On the basis of the information available, the LUCF sector is estimated to be a net sink in the Czech Republic with net CO_2 equivalent removals of about 1.1 per cent and 3.1 per cent of total emissions without LUCF in 1995 and

2003 respectively. The ERT recommends that the Czech Republic complete the inventory estimates and time series for LULUCF, report using the revised CRF tables agreed in decision 13/CP.9, and set up a formal QA/QC assessment system for this sector.

B. Sink and source categories

Changes in forest and other woody biomass stocks – CO_2

52. The estimation of emissions and removals from LUCF is based on national statistical data. Although the national forest inventory is reported to be detailed, no description of it is given in the NIR. The IPCC default method has been used to estimate carbon stock changes, but the description of these assumptions is not transparent and the NIR should therefore include more information on the methodologies used to obtain data, the actual data, the origin of emissions and removal factors, and how expert judgement has been applied. For example, data on growth rates by species or species groups are needed to make it possible assess whether the growth rates reported are acceptable.

53. Although it is not clear exactly how the data are used, table 7.2 of the NIR provides two sets of conversion factors for obtaining dry biomass from wood with bark volume. One set seems to be applicable to harvested wood, but does not indicate whether coniferous or non-coniferous wood is referred to. The other set seems to be applied to standing wood, but does not say whether the values given are averages for all age cohorts. Also, the conversion factors should be 1 plus the value given in the table, for example, for stump mass to timber with bark it should be 1.018 instead of 0.018.

54. Uncertainty estimation is not included in the NIR, but the Party has undertaken to provide this after it has implemented the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* .

VI. Waste

A. Sector overview

55. In 2003, the Waste sector contributed an estimated 1.9 per cent to the total GHG emissions of the Czech Republic and 22.5 per cent of total CH_4 emissions. From 1990 to 2003 the total sectoral CO_2 equivalent emissions decreased by an estimated 4.8 per cent (or 24.5 Gg of CH_4), mainly due to a reduction in emissions from managed waste disposal sites as a result of the introduction of CH_4 recovery systems. The Czech Republic has introduced improvements in this inventory submission compared to the previous one: they concern the inclusion of N_2O emissions from waste water (for the first time) and the provision of a description of the methodology for estimating emissions from waste incineration. Other issues not yet addressed are identified below. The Czech Republic is encouraged to continue to work to improve the completeness and consistency of its reporting.

56. The NIR explains a number of recalculations made in the sector as a result of regular updates to the underlying AD, the updating of emission parameters or changes in methodology.

B. Key categories

Managed solid waste disposal sites: Municipal waste disposal on land – CH_4

57. In 2003 emissions from this category amounted to 83.4 Gg CH_4 and it is identified as a key category by level assessment. Emissions have been estimated using the default IPCC method (tier 1) because of lack of the data needed to apply the FOD method. The Czech Republic has indicated to the ERT that a case study in the use of the FOD method has been undertaken, and that it intends to include the FOD method in its next submission when gaps in pre-1990 AD are resolved. The ERT encourages

the Czech Republic to obtain or estimate AD on the amounts and composition of historical waste disposal in order to facilitate application of the FOD method in its next inventory submission.

58. The value used for the oxidation factor (OX) seems high. Information is not provided on the destination of the sludge or to indicate whether part of this was deposited in solid waste disposal sites (SWDS). The ERT recommends that the Czech Republic reconsider the use of OX = 0.15 and improve the information provided on the fate of the sludge.

59. The NIR reports annual municipal solid waste (MSW) at the managed waste disposal sites in 2003 as 2,924 Gg CH_4, whereas the value shown in CRF table 6.A is 2,826 Gg CH_4. These figures should be reconciled.

C. Non-key categories

1. Waste-water handling – CH_4

60. In 2003 CH_4 emissions from industrial wastewater amounted to 12.3 Gg. The methodology recommended in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance has been used to make the estimate. CH_4 emissions from domestic and commercial wastewater amounted to 8.5 Gg. Although the Revised 1996 IPCC Guidelines specify only a tier 1 method, the CRF states that a tier 2 estimation has been used, with default and country-specific EFs. The nature of the implied modification to the tier 1 method needs clarification.

2. Waste-water handling – N_2O

61. In 2003 the emissions estimated for domestic and commercial waste water corresponded to the discharge of human sewage in aquatic environments, and amounted to 0.64 Gg N_2O. The calculation follows the method in the Revised 1996 IPCC Guidelines and the default emission parameters. The NIR does not document the data on protein consumption per capita used in the calculation. The same value for N_2O emissions (0.65 Gg) is reported from 1990 to 2000. This behaviour of the emission trend and its causes is not explained or documented in the NIR. Information is not given on the fate of the sludge; in particular there is no information on whether some part of it was applied to soils in 2003. The ERT recommends the Czech Republic to provide references to its figures on protein consumption per capita, to clarify the reasons for the emissions trend reported and to improve the information provided on the destination of sludge.

3. Waste incineration – CO_2

62. In 2003 CO_2 emissions from this category amounted to 368.3 Gg. They have been estimated based on the tier 1 approach and default EFs from the IPCC good practice guidance. According to CRF table 6.C, 441 Gg of non-biogenic waste were incinerated in 2003. This information seems not to be correct because table 8.13 in the NIR specifies that 2.8 Gg of clinical waste and 73.2 Gg of hazardous waste were also incinerated. Information is lacking on the composition of the non-biogenic material that was incinerated. In CRF table 10, the same value (357 Gg) for CO_2 emissions from waste incineration is reported for 1992 and for the years 1994–2002. Emissions in 1990 are reported as "0". This behaviour of the emissions trend and the reasons for it are not explained or documented in the NIR. The ERT recommends the Czech Republic to clarify the causes of the trend reported for the CO_2 emissions from this source category.

63. In 2003, 441 Gg of MSW were incinerated according to CRF table 6.C. This amount seems to be the total of the waste used as a fuel (219 Gg) and waste combusted on land (222 Gg). CO_2 emissions from waste incinerated as fuel should be reported in the Energy sector according to the Revised 1996 IPCC Guidelines. The Czech Republic has indicated to the ERT that emissions from incineration were all

reported in the waste sector because the amount of incineration with energy recovery is uncertain, and to maintain consistency with previous years' reporting. The ERT recommends that the Czech Republic should if possible provide the missing information to enable the correct allocation of emissions to the appropriate sectors.

4. Waste incineration – N_2O

64. In 2003 emissions of N_2O from this category amounted to 0.02 Gg. Emissions have been calculated using the IPCC good practice guidance default method on the basis of the EFs provided. Emissions are not estimated for other years, so there is no consistent time series. The ERT encourages the Czech Republic to provide information on its N_2O emissions from waste incineration for other years.

D. Areas for further improvement

1. Identified by the Party

65. The Party is planning to adopt a tier 2 method for calculating CH_4 emissions from landfills; to recalculate the entire time series consistent with the IPCC good practice guidance; to recalculate emissions from waste incineration using a more transparent approach; and to increase accuracy and reduce uncertainty by using measured data on waste composition.

2. Identified by the ERT

66. The ERT felt that the most important areas for improvement are to obtain or estimate the AD on current and historical waste disposal that are needed, in order to apply the FOD method for the estimation of CH_4 emissions from SWDS, including data on the composition of landfilled waste, the destination of sludge and other AD.

Annex

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at: <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Pavel Fott (Czech Hydrometeorological Institute), and included additional material on the methodology and assumptions used.

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